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Indian Corn

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INDIAN CORN

.. BY ..

JAMES ELLIS ARMSTRONG

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THESIS

FOR THE

DEGREE OF BACHELOR OF SCIENCE

IN THE

COLLEGE OF AGRICULTURE

UNIVERSITY OF ILLINOIS

1903



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1	1985	1985-1986
2	1986	1986-1987
3	1987	1987-1988
4	1988	1988-1989
5	1989	1989-1990
6	1990	1990-1991
7	1991	1991-1992
8	1992	1992-1993
9	1993	1993-1994
10	1994	1994-1995
11	1995	1995-1996
12	1996	1996-1997
13	1997	1997-1998
14	1998	1998-1999
15	1999	1999-2000
16	2000	2000-2001
17	2001	2001-2002
18	2002	2002-2003
19	2003	2003-2004
20	2004	2004-2005
21	2005	2005-2006
22	2006	2006-2007
23	2007	2007-2008
24	2008	2008-2009
25	2009	2009-2010
26	2010	2010-2011
27	2011	2011-2012
28	2012	2012-2013
29	2013	2013-2014
30	2014	2014-2015
31	2015	2015-2016
32	2016	2016-2017
33	2017	2017-2018
34	2018	2018-2019
35	2019	2019-2020
36	2020	2020-2021
37	2021	2021-2022
38	2022	2022-2023
39	2023	2023-2024
40	2024	2024-2025
41	2025	2025-2026
42	2026	2026-2027
43	2027	2027-2028
44	2028	2028-2029
45	2029	2029-2030
46	2030	2030-2031
47	2031	2031-2032
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49	2033	2033-2034
50	2034	2034-2035
51	2035	2035-2036
52	2036	2036-2037
53	2037	2037-2038
54	2038	2038-2039
55	2039	2039-2040
56	2040	2040-2041
57	2041	2041-2042
58	2042	2042-2043
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60	2044	2044-2045
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63	2047	2047-2048
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78	2062	2062-2063
79	2063	2063-2064
80	2064	2064-2065
81	2065	2065-2066
82	2066	2066-2067
83	2067	2067-2068
84	2068	2068-2069
85	2069	2069-2070
86	2070	2070-2071
87	2071	2071-2072
88	2072	2072-2073
89	2073	2073-2074
90	2074	2074-2075
91	2075	2075-2076
92	2076	2076-2077
93	2077	2077-2078
94	2078	2078-2079
95	2079	2079-2080
96	2080	2080-2081
97	2081	2081-2082
98	2082	2082-2083
99	2083	2083-2084
100	2084	2084-2085



## INDIAN CORN

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A large number of investigations in corn culture has been carried on by this and neighboring experiment stations and many practical questions have been answered. It seems as if there is no phase of this subject that has not been worked out to some extent. Some problems have been solved definitely while from investigations in other lines no conclusions can yet be drawn although the work has been continued for a number of years. Since this is the most important crop produced in the larger part of the state, it is wise to continue experiments and investigations along this line until details are so thoroughly worked out that the majority of farmers can raise maximum crops if they profit by the information thus obtained. While the following discussions do not settle anything they are given by one who is not prejudiced in favor of, nor against, any particular practice or theory. They cover briefly root pruning, cultivation, detasseling, suckers and barren stalks, and observations of the time of tasseling and silking.

### ROOT PRUNING

The plots for this experiment were selected on the east side of my father's farm near Bondville, Ill. The seed, Chester's Learning, had been planted about May 10, 1902 in the ordinary way and averaged a little over two stalks to the hill. The hills were



three and one half feet apart and there were forty hills in a row. As it was late in the spring before the experiment was undertaken all of the corn had been cultivated once. In plot II some of the rows were pruned once, some twice and some three times at the same depth and the same distance from the hill. The first pruning was done the second week in June, the second a week later and the third a week after the second. In plot I the pruning was done once only during the third week in June. The implements used were a pruning hoe for any depth up to six inches, and a wire or cutaway spade for eight and ten inches deep. The roots were cut on four sides of the hill except in rows 37 and 39 of plot II where they were cut on two sides at one time. It is very unusual for a man to cultivate as deep as six inches but the deep prunings were made to find out if possible which roots were the most necessary for the plant's growth. The corn was not cultivated after the experiment was started but the surface was loosened by the use of a triangular harrow and the weeds were kept down with a hoe.

It will be remembered that there was an unusually large amount of rainfall during the past summer. During the month of June the rainfall was 10.93 inches, in July 4.7 inches and in August 9.84 inches. The average amount during the last thirteen years for the month of June was 4.21 inches, for July 3.23 inches and for August 2.84 inches. As the extra supply of water fell during the season of growth, we can easily account for the small loss or no loss on some of the pruned rows. If the amount of rainfall had been small the roots could not have brought sufficient moisture from the deeper soil and the plant would have suffered from partial starvation. When a root is cut off it will not grow in length from the end, since the growing part is at the tip. The writer observed the ends of one or two roots a week after they





had been pruned, and found new growth starting from the sides near the end. There were as many as twenty rootlets within one inch of the end, varying from one-fourth to one and one-half inches in length some of which were greatly enlarged. It is a general observation that when roots of agricultural plants are cut or injured they send out more secondary roots or cause those already in existence to increase in size and length, thus making the root system more compact and confining it to a smaller amount of soil. These rootlets may be able to collect as much moisture and plant food as the whole root would have done if it had not been cut off, but as they do not go deep into the soil the plant would undoubtedly suffer on a dry year. It was my purpose to wash out the roots of a pruned and an unpruned hill for comparison but lack of time prevented this. This has, however, been done by others and the observations were as stated above.

The rows that were pruned two and four inches from the hill began to show the effect of the pruning within ten days. The upper leaves were pale instead of being a deep green and the lower leaves turned yellow. About the fourth of July the unpruned rows were apparently a foot taller than the pruned rows, although the height was not measured. Heavy rains followed, however, and when the corn had tasseled it was very difficult to tell by appearance which were pruned and which were not. In those pruned six, eight and ten inches deep there was no noticeable effect for about three weeks. In the middle of July the pruned rows had stalks shorter and more slender than the unpruned rows, and this difference was plain after tasseling. Later it was quite evident that the majority of the ears on the pruned rows would be small and this proved to be the case.

Before tasseling had begun the writer went through plot I



and the first eighteen rows of plot II, taking out the suckers and thinning so that each odd numbered row had the same number of stalks as the next even numbered row.

On July 18th, Mr. D.D. Center assisted in selecting representative hills from the rows pruned two and four inches from the hill, from those pruned six, eight and ten inches deep, and from unpruned rows next to them. Photographs of these were taken and they show quite plainly the effect of the injury to the roots.

The corn was harvested October 25th. All ears that were about seven inches long and were fairly well filled were called good and all others were called poor ears. The following tables give the number of good and poor ears, the weight of good and poor ears, the total number of ears, the total weight, and the rate per acre.





## Plot I (Pruned only - 1922)

No. of trees	Treatment	No. good ears.	No. poor ears	Ht. of good ears	Ht. of poor ears	Total number	Total weight	250 lbs. per bush
1	Not pruned	41	15	39.75	5.75	56	35	10.0
2	3 from hill 4 down	41	14	30.5	5.25	55	33.75	11.8
3	Not pruned	45	13	35.5	5.5	58	41	47.0
4	3 from hill 4 down	35	31	15	11.5	66	33.5	31
5	Not pruned	53	19	41.75	0	72	50.75	50.5
6	3 from hill 4 down	45	32	30.25	15	77	45.25	52.9
7	Not pruned	57	10	42.5	0	67	51.5	50.3
8	4 from hill 4 down	47	27	32	10.5	74	42.5	40.7
9	Not pruned	57	31	41	11.5	88	53.5	51.4
10	4 from hill 4 down	55	33	37	11	88	46	56.1
11	Not pruned	64	36	40	15.5	100	54.5	60.5
12	4 from hill 4 down	40	35	27.5	14.5	75	43	49.1
13	Not pruned	53	20	40	3	73	43	53.1
14	3 from hill 4 down	53	25	35.5	13.5	78	40	57.5
15	Not pruned	56	28	41.5	3.5	84	50	55.5
16	3 from hill 4 down	53	14	33	5	67	43	53.5
17	Not pruned	51	10	43	5	61	46	53.3
18	3 from hill 4 down	43	30	25.5	0.5	73	35	41.4
19	Not pruned	71	15	42.5	7.5	86	50	53.5
20	10 from hill 4 down	53	53	37	14.5	106	41.5	13.5
21	Not pruned	59	50	51.5	14.5	109	56	42.1
22	10 from hill 4 down	43	27	30	10	70	40	43.3
23	Not pruned	47	35	30.5	3	82	55.5	45
24	10 from hill 4 down	51	17	43	5	68	47	54.0
25	Not pruned	53	33	37.5	11.5	86	49	57.5
26	15 from hill 4 down	53	17	40	5.5	70	57.5	57.5





Fig 1.

Not pruned

Plants 2 inches from the  
hill, 4 inches deep.





No./Date	Treatment	No. good	No. poor	No. dead	No. lost	Total	Mean	Std. Dev.
27	Not pruned	37	13	30.5	7	57	53.5	36.1
28	12 feet hill 4 deer	55	17	45	10	80	51	36.1
29	Not pruned	50	12	40	7.5	71	53.5	36.1
30	12 feet hill 4 deer	51	7	44.5	—	58	44.5	36.7
31	Not pruned	55	21	53.5	5	81	44.5	32
32	6 feet hill 3 deer	57	30	40.5	10	97	50.5	59
33	Not pruned	59	13	40	5	77	45	50.5
34	6 feet hill 3 deer	55	35	45	7	97	53	62
35	Not pruned	51	34	40	10	85	50	53.5
36	6 feet hill 3 deer	57	15	45	3	75	51	59.5
37	Not pruned	65	12	40.5	—	77	42.5	56.7
38	6 feet hill 3 deer	53	34	54	10	97	44	51.4
39	Not pruned	52	35	55	11.5	97	46.5	51.4
40	6 feet hill 3 deer	41	35	38.5	14.5	77	41.5	47.7
41	Not pruned	45	37	52.5	13	75	45.5	53.2
42	6 feet hill 3 deer	43	35	50	10	71	40	43.5
43	Not pruned	56	22	40.5	9.5	75	50	50.5
44	6 feet hill 3 deer	40	41	29	15	71	42	49.1
45	Not pruned	60	27	45	13	87	56	35.5
46	6 feet hill 3 deer	59	43	19	16.5	75	33.5	42.7
47	Not pruned	57	25	41	11.5	70	52.5	61.4
48	6 feet hill 3 deer	32	45	17.5	20.5	77	40	46.2
49	Not pruned	37	23	47	10.5	60	51.5	67.2
50	6 feet hill 10 deer	11	35	7	34	75	51	56.5
51	Not pruned	22	32	31	14.5	70	42.5	43.7
52	6 feet hill 10 deer	16	55	11.5	23	71	55.5	33.2
53	Not pruned	50	17	40.5	3	77	57.5	67.2
54	6 feet hill 10 deer	31	40	14.5	13.5	74	51	35.2

Year	Month	Day	Time	Location	Observer	Remarks
1980	Jan	1	08:00	Station 1	J. Smith	Clear sky, light breeze
1980	Jan	2	08:00	Station 1	J. Smith	Clear sky, light breeze
1980	Jan	3	08:00	Station 1	J. Smith	Clear sky, light breeze
1980	Jan	4	08:00	Station 1	J. Smith	Clear sky, light breeze
1980	Jan	5	08:00	Station 1	J. Smith	Clear sky, light breeze
1980	Jan	6	08:00	Station 1	J. Smith	Clear sky, light breeze
1980	Jan	7	08:00	Station 1	J. Smith	Clear sky, light breeze
1980	Jan	8	08:00	Station 1	J. Smith	Clear sky, light breeze
1980	Jan	9	08:00	Station 1	J. Smith	Clear sky, light breeze
1980	Jan	10	08:00	Station 1	J. Smith	Clear sky, light breeze
1980	Jan	11	08:00	Station 1	J. Smith	Clear sky, light breeze
1980	Jan	12	08:00	Station 1	J. Smith	Clear sky, light breeze
1980	Jan	13	08:00	Station 1	J. Smith	Clear sky, light breeze
1980	Jan	14	08:00	Station 1	J. Smith	Clear sky, light breeze
1980	Jan	15	08:00	Station 1	J. Smith	Clear sky, light breeze
1980	Jan	16	08:00	Station 1	J. Smith	Clear sky, light breeze
1980	Jan	17	08:00	Station 1	J. Smith	Clear sky, light breeze
1980	Jan	18	08:00	Station 1	J. Smith	Clear sky, light breeze
1980	Jan	19	08:00	Station 1	J. Smith	Clear sky, light breeze
1980	Jan	20	08:00	Station 1	J. Smith	Clear sky, light breeze
1980	Jan	21	08:00	Station 1	J. Smith	Clear sky, light breeze
1980	Jan	22	08:00	Station 1	J. Smith	Clear sky, light breeze
1980	Jan	23	08:00	Station 1	J. Smith	Clear sky, light breeze
1980	Jan	24	08:00	Station 1	J. Smith	Clear sky, light breeze
1980	Jan	25	08:00	Station 1	J. Smith	Clear sky, light breeze
1980	Jan	26	08:00	Station 1	J. Smith	Clear sky, light breeze
1980	Jan	27	08:00	Station 1	J. Smith	Clear sky, light breeze
1980	Jan	28	08:00	Station 1	J. Smith	Clear sky, light breeze
1980	Jan	29	08:00	Station 1	J. Smith	Clear sky, light breeze
1980	Jan	30	08:00	Station 1	J. Smith	Clear sky, light breeze
1980	Jan	31	08:00	Station 1	J. Smith	Clear sky, light breeze



Fig 2. Not Pruned

Pruned 4 inches from top  
and 1 inch from base.





Table 17 (continued) (continued)

No. of times	Measure taken	No. of good	No. of poor	No. of good	No. of poor	Total number	Total weight	Average
1	One time	26	31	13	11.5	61	22.5	36.4
2	Not burned	61	30	15.5	8	61	32.0	36.4
3	Three times	37	30	14	10.5	59	34.35	37.3
4	Not burned	54	41	21	15.5	70	36.0	37.7
5	Three times	39	30	8	13	61	34	36
6	Not burned	45	45	20.5	17	80	37.5	43.3
7	Two times	43	51	10.5	13	73	33.5	38.5
8	Not burned	33	43	25	14	61	37	43.2
9	Two times	38	50	25	17	63	42	40.1
10	Not burned	44	50	26.5	10	73	36.5	43.4
11	Two times	28	40	14	13.25	53	27.25	51.5
12	Not burned	37	30	23.5	14	57	37.5	45.3
13	One time	46	55	23	1	71	31	50.7
14	Not burned	40	33	33	3.75	63	31.75	57.4
15	One time	41	47	33	15	66	42	61.5
16	Not burned	53	51	20.5	21	61	41.5	49.5
17	One time	40	45	25.5	13.5	55	40	49.1
18	Not burned	43	36	35.5	13.5	70	40	43.3
19	Three times	44	37	27.5	14	61	41.5	44.5
20	Not burned	40	45	30	17.5	64	43.5	64.7
21	Three times	47	35	34	11.5	70	40.5	47.3
22	Not burned	30	23	30	5	63	47	54.0
23	Three times	50	25	36	6.5	61	43.5	49.7
24	Not burned	62	34	33	12.5	63	51.5	60.5
25	Two times	57	35	35.5	13	70	45.5	66.7
26	Not burned	56	40	35	10	102	54	63.1

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100
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111	112	113	114	115	116	117	118	119	120
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161	162	163	164	165	166	167	168	169	170
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191	192	193	194	195	196	197	198	199	200
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221	222	223	224	225	226	227	228	229	230
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251	252	253	254	255	256	257	258	259	260
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271	272	273	274	275	276	277	278	279	280
281	282	283	284	285	286	287	288	289	290
291	292	293	294	295	296	297	298	299	300
301	302	303	304	305	306	307	308	309	310
311	312	313	314	315	316	317	318	319	320
321	322	323	324	325	326	327	328	329	330
331	332	333	334	335	336	337	338	339	340
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951	952	953	954	955	956	957	958	959	960
961	962	963	964	965	966	967	968	969	970
971	972	973	974	975	976	977	978	979	980
981	982	983	984	985	986	987	988	989	990
991	992	993	994	995	996	997	998	999	1000



Fig 3.

Not Pruned

Pruned 6 inches from top  
6 inches deep.





27 Two times	53	51	53	18	53	55	53.1
28 Not pruned	53	35	36	10	51	46	51.5
29 Two times	57	34	57.5	1.5	41	45	53.3
30 Not pruned	44	37	51	12	47	44	51.4
31 One time	53	37	43	11.5	50	54.5	53.7
32 Not pruned	51	31	35	13.5	55	47.5	53.5
33 One time	43	35	39	14	76	43	50.3
34 Not pruned	61	36	40	10	43	50	51.5
35 One time	54	33	37.5	13.5	55	54	53.1
36 Not pruned	32	23	41.5	11.5	50	53	52
37 Three times 2 sides	57	39	39	11.5	57	50.5	52
38 Not pruned	37	34	47.5	3.5	51	56	53.5
39 Three times 2 sides	54	36	37	11.5	50	43.5	53.7
40 Not pruned	53	25	41.5	11	53	52.5	51.4





971

F. 71

Not Pruned

Pruned 6 inches from the  
hill, 6 inches deep.





The following table gives the results of the above. It is obtained from the preceding by adding together the weights of corn produced on the rows that received the same treatment.

Rows	Treatment	Yield	Bushels per acre.
3	Not pruned	125.75	40.4
3	Pruned 3 from hill 4 down	107.5	41.9
3	Not pruned	157.5	51.4
3	Pruned 4 from hill 4 down	152.5	51.3
3	Not pruned	144	56
3	Pruned 6 from hill 4 down	133	51.3
3	Not pruned	134.5	52.5
3	Pruned 10 from hill 4 down	123.5	50
3	Not pruned	133	63.1
3	Pruned 12 from hill 4 down	130	52.3
3	Not pruned	133.5	54.4
3	Pruned 6 from hill 2 down	154.5	60.2
3	Not pruned	140.5	54.7
3	Pruned 6 from hill 3 down	125	43.7
3	Not pruned	152.5	51.3
3	Pruned 6 from hill 3 down	117.5	46.2
3	Not pruned	151.5	59
3	Pruned 6 from hill 10 down	95.5	57.2
6	Pruned 6 from hill 4 down 3 times	105.25	37.4
6	Not pruned	142.5	47.2
6	Pruned 6 from hill 4 down 2 times	240.25	46.3
6	Not pruned	254	48.5
6	Pruned 6 from hill 4 down 1 time	271.5	52.9
6	Not pruned	263.75	51.4
2	Pruned 6 from hill 4 down 2 sides	79	53.4
2	Not pruned	103.5	63.9





Fig. 5

Not Pruned

Pruned 6 inches long  
at 10 in. high.





It is a somewhat difficult matter to tell by these results just what harm was done by hurting the roots. A glance at the third table where results are averaged will show that in every case but the fourth, sixth, and eighth trials there was a smaller yield from the pruned rows. One may wonder why there should be a difference equal to six bushels per acre in favor of the rows pruned two inches deep and six inches from the hill is hard to understand, because the pruning in this case did not go much, if any, deeper than the harrow, so the two sets of rows should have yielded very nearly the same. If something besides root pruning caused the difference in this case, the same thing might have produced results in other cases in favor of the unpruned rows. In looking over the first table we occasionally find two unpruned rows only seven feet apart, having a proportionally greater difference, even when the number of ears was the same on both rows, than that referred to above. The plots were located on land that was a little lower than the remainder of the field. After one or two heavy rains the water stood in places on these plots for about a day, and the ground was undoubtedly saturated for a longer period. The damage done by the excessive amount of water was probably not the same on all parts of the plots, so this may account for some variation in the yields of the different rows. From what has been said it would hardly be a valid conclusion that all the root pruning outside of those mentioned did reduce the yield. After having made frequent observations during the growing period and noting the comparative yields, the writer does not hesitate to say that the rows pruned two and four inches from the hill, and those pruned six, eight and ten inches deep were injured to a considerable extent. Of the remainder nothing positive can be asserted. Although other experimenters have found that decreased yields resulted from some



treated in a similar manner. It is true that the results do not show any kind of correlation, but they do prove nothing. To say that the results are not showing any correlation with the growth of the plant shall be, but we are unable to tell what caused the results without knowing the same experimental conditions through several seasons. There are variations in the temperature of the air and soil, in moisture, in plant food, and in the position of the soil that must be taken into consideration. As was stated above, the reduction in yield yield probably had been more noticeable if the season had been dry instead of wet.

#### Other Work in Root Pruning.

This station has carried on root pruning experiments for a number of years. Below is a table showing comparative results for five years where the pruning was done at practically the same depth and the same distance from the hill.

Year	Treatment						Pruned	Unpruned	Decrease %
1888	3 times	1-3	3	deeps	3	from hill	46.3 bu.	68.9 bu.	1.5%
1889	"	"	4	"	"	"	72.3	66.5	13%
1890	"	"	"	"	"	"	54.4	71	23%
1891	"	"	"	"	"	"	49.4	73.1	33%
1892	"	"	"	"	"	"	70.7	76.3	10.8%
1893	"	"	"	"	"	"	86.4	95.4	9.8%

Later other work was done when the pruning was tried at different depths. For these seasons the average results were about as follows:





Not pruned	65 bu. per acre
Pruned 3 in.	60 " "
Pruned 4 in.	15 " "
Pruned 6 in.	60 " "

The Minnesota Station has published the following table giving the results of their work for three years with root pruning.

1889	Pruned	35 bu.	Unpruned	48 bu.
1890	"	34-1/3	"	33-2/3
1891	"	41-1/3	"	13-1/3

At the Oklahoma Station the same thing was tried out no injury was found where the pruning was three inches deep. At 6 inches deep and from 6 to 12 inches from the hill the yield was materially reduced, but pruning 22 inches from the hill caused no damage.

#### Conclusion.

It is evident from the above experiments that root pruning generally causes a decreased yield, and the deeper the pruning the greater the loss from the pruned rows. It is not usual for farmers to cultivate deeper than four inches even with the large shovels, and as cultivation cuts the roots only on two sides at one time we need not expect the loss to be as great as in that root pruned on four sides at once. It is probable that cutting the roots does not do as great injury to the corn during a wet season as during a dry one.



## ROOT GROWTH

In order to understand the results of these experiments it is well to know something about the manner of root growth in corn. A number of investigators have made a study of this question and their observations generally agree. The plan of the work was to wash out the dirt from the roots of the plant by a stream of water under pressure. Sometimes the seed was planted in a sort of a cage so that when the dirt was washed out the roots would remain about as they were in the soil. The following description of root growth is according to the observations that have been made.

The first root pushes out of the covering of the chit a day or so before the point of the stalk does. The stem grows up vertically through the soil and forms the first leaf whose base is the first node or joint. This node is usually formed from one to two inches below the surface of the soil even when the seed is planted at different depths. If the soil is dry, or ground uneven, it is sometimes necessary to plant deep and in either case there is probably no harm done and nothing gained. The stem between the seed and the first node is more slender and longer, so that the node is as near the surface as if the seed were planted shallow. Ordinarily two or three inches is about the right depth to plant the seed. While the stem is growing from two to four inches to reach the surface the root increases from five to ten inches in length, and is covered with numerous minute hairs, ready to absorb the plant food with which they come in contact. These minute hairs or sucking cells are only found near the tip of the root. An inch or two from the tip there are found branching or secondary roots that are shorter and more slender than the primary roots. These are also covered with sucking cells. Near the center of the



chit two or four other roots begin to grow soon after the first has started, and all of these are called the first or seminal whorl of roots. When the soil is moist and warm near the surface these roots grow outward and very nearly in a horizontal direction from two to four feet. Later when the soil begins to dry they turn down and grow from two to five feet more. When the seminal whorl has grown from six to twelve inches, a second whorl of three to five roots forms at the base of the first leaf and is called the first nodal whorl. These roots have practically the same length and direction as the first whorl. A third whorl starts out after a few days from the second node which is only about one-fourth of an inch above the first node. From the third node grows a whorl of from four to six roots. The fifth whorl has on an average six roots; the sixth, eight roots; the seventh, twelve roots; and the eighth, seventeen roots. These roots are larger in diameter and the nodes are farther apart than were the earlier ones. All of these roots leave rootlets along their line of growth to take up moisture and plant food. The majority of the rootlets are, however, in the first foot or two of soil. The (the) seventh, eighth and ninth whorls generally grow just under the surface of the hill before the plant begins to tassel. About the time of tasseling one or two whorls of brace roots start at or above the surface of the hill. These help to anchor the plant to the ground and may form secondary roots for the absorption of moisture.

The direction taken by the different whorls of roots depends somewhat on the kind of soil, the amount of moisture, and temperature. In spring when the soil is moist and warm on the surface, and cold beneath, the first five whorls tend to grow in a horizontal direction. This may be due also to the large amount of plant food near the surface. After about one month these change





their direction and so nearly vertically downward. The roots of the first two or three whorls usually die before maturity and leave the larger ones to supply nourishment. The remainder of the whorls of roots usually take a downward course from the first. It has been found that in a dry spring the roots of the first few whorls strike downward at once also.

The rate of growth differs, of course, with the surroundings. Professor King found that at the end of nine days some of the roots extended to a distance of sixteen inches from the hill and to a depth of eight inches. No roots were nearer than three inches from the surface at six inches from the hill. After eighteen days the roots extended laterally eighteen inches from the hill and some had reached a depth of twelve inches. None were nearer than two inches from the surface at six inches from the hill. At the end of twenty-seven days the greatest depth to which the roots had reached was eighteen inches and some had extended two feet from the hill. When the corn was eighteen inches high, forty-two days after planting, the roots had not only passed each other and were about eight inches deep at the center of the row. When the corn was laid by and the stalk was three feet tall, the roots filled the soil to a depth of two feet, and at tasseling they occupied the upper three feet of soil and were within five inches of the surface at the center of the row. Later in the season the leaders were found within four inches of the surface and their rootlets, from four to six inches long, reached almost to the surface of the ground.

At the Colorado Station roots were found thirty days after planting to have extended two and one-half feet deep and three feet from the plant. Later some were traced five feet deep and as far to one side. In black adobe soil the roots were located



mostly in the upper foot of soil, while in the heavy clay soil they grow downward at a moderately sharp angle but the most of them were in the first two feet of soil.

### CORN CULTIVATION

The subject of depth of cultivation follows naturally after the consideration of the foregoing phases of corn culture. The experiment station of practically every state whose farmers are engaged in the production of corn has published results of experiments in deep and shallow cultivation. In twenty one of these experiments from different states, eleven gave yields in favor of shallow cultivation, seven in favor of deep cultivation, and in the other four there was no decided difference. This, of course, means very little, if anything, to us. Some of these reports showed unmistakable evidence of a juggling with figures in order to bear out some theory of the experimenter. Some men connected with an experiment station will start experiments with the idea of proving one certain proposition, and they so manipulate the conditions or doctor the results that their previous conclusion is supported. In all experimental work that amounts to anything one out of two or three results should be looked for. For instance, if one were to experiment with depth of cultivation he should not start with the idea of proving that shallow cultivation was best but should make conditions and treatment as nearly alike as possible except in the depth to which he cultivated, and in this case he should look for one of three results: a yield in favor of shallow cultivation, a yield in favor of deep cultivation, or yields so nearly the same that he could not say one depth was better than





the other. Now, the juggling of figures in a report can often be detected by the careful reader, but when the doctoring is done in the manipulation or control of the conditions the reader has no way of detecting this fact. Another fault in experimental work is the drawing of conclusions from too few data. Sometimes advice is given based on one or two year's experience, and when the farmer finds that the same result does not always follow he loses faith in such work. Methods of this kind tend to throw all experimental work into disrepute, because the average intelligent farmer does not know whose results are trustworthy. The time will soon come when the work of no one will be accepted except of those who are widely known as honest, accurate, scientific investigators.

This station conducted a test of ordinary deep and shallow cultivation for five years from 1888 to 1892, in 1895 and in 1902. A brief summary is given below together with the rainfall for the five growing months in each year and the average rainfall for eight years. It will be noticed that in the first two years the rainfall was above the average, and the result favored shallow cultivation. The third year the rainfall was a little below the average and yet the yield favored shallow tillage. The fourth was a very dry season and corn cultivated deep did best as it did also the fifth year when the rainfall was a little above the average for the five months. In 1895 there was very little difference between plots cultivated at different depths although the rainfall was very heavy. Last year deep tillage gave a little larger yields and the rainfall was more than twice the average.



Year	Cultivation		Rainfall					
	Shallow	Deep	May	June	July	Aug.	Sept.	Total 5 mo.
1888	93.3 bu.	34.9	5.31	5.75	5.51	5.14	1.95	23.66
1889	84.6	74.2	5.52	5.31	5.31	0.60	2.77	21.51
1890	63.5	60.6	3.56	3.60	2.83	1.93	1.19	13.31
1891	63.4	63.4	0.39	2.03	1.41	2.36	0.41	7.65
1892	70.1	30.1	7.36	5.36	2.5	2.43	0.93	19.03
1896	63.4	36.3	5.62	2.93	7.67	3.74	5.34	26.05
1902	67.9	69	2.61	10.98	1.7	0.8	4.9	32.99
Average for 3 years			4.22	3.32	3.21	1.94	3.02	15.71

Since good returns come sometimes by shallow and at others by deep tillage it will not be out of place to review some of the reasons that might be given to explain the advantage and disadvantage of both methods. It will be remembered from the statements in regard to root pruning and growth that the entire feeding surface of the roots was confined to the lateral primary and secondary roots for three or four weeks at least, and that some of these roots were within three inches of the surface at six inches from the hill. Now, those who recommend shallow cultivation insist that the cutting of these roots by the large shovels will injure the growth of the plant and reduce the yield. We know that when a root is cut off the new tip can not serve as a mouth for taking up plant food and the feeding surface can be regained only by sending out new secondary roots or enlarging those already present. This undoubtedly takes up energy of the plant that should be used in the production of leaves and stem. However, plants adapt themselves to circumstances very quickly and repair the injury as much as possible, so that if some of the roots are cut the tendency is to make a





more compact root system than would otherwise be formed. This would be detrimental to the plant if the season were dry or if the upper layer of soil were coarse and did not retain sufficient moisture, because the roots could not go deep enough to get the needed water. Another benefit to be derived from shallow tillage is the dust mulch which aids in the conservation of moisture. The part of the soil out of which a mulch is made is the richest on the farm, so the qualities of a good mulch require that it be as thin as possible and yet prevent too great a waste of the soil moisture. If the tool that is used leaves a uniform covering of stirred soil the mulch can be lighter than if the ground has been left in ridges.

An interesting experiment in cultivation was made at the Missouri Station in 1890, where two tenth-acre plots were cultivated shallow and two deep with the following results:

Deep cultivated, average two plots	41.2 bu.
Shallow cultivated, two plots	53.3 bu.

In order to see whether or not the difference was due to root pruning, two other tenth-acre plots were used. One was cultivated shallow and one deep and the corn on both plots was pruned a little deeper than the deep tillage. The yields were:

Deep cultivated, root pruned	48 bu.
Shallow cultivated, root pruned	53 bu.

Since I found but one experiment of this kind no conclusion can be made but the results suggest that there was something else besides root pruning that caused the decrease in the deep tilled plots. There may have been more moisture retained by the shallow culti-





vation, because less soil was exposed than by deep cultivation.

On the other hand the large shovel cultivator is a good tool to use for the destruction of weeds, to loosen up the soil, and to dry the surface during a wet season by increasing the amount of surface from which evaporation can take place. If the weeds are allowed to grow in the corn field they will use plant food and moisture that should be taken by the corn plant, so their presence very likely does more damage than is done by the deep cultivation. When weeds have a good start there is no tool so convenient to handle and as efficient in destroying all kinds of weeds as the large shovel cultivator. Ordinarily a man can keep ahead of the weeds by properly preparing the seed bed but there are times when vigorous means must be used in order to prevent their development. With some kinds of soils on a dry year deep culture is often advisable in the early part of the season to loosen up the soil as deep as possible so that the air and rain will enter readily and pass down to where the feeding surfaces of the roots are. The injury to the roots is probably not very great in this case as they tend to strike downward on a dry year instead of spreading out laterally. If the rainfall is heavy and the soil becomes too wet for the bacteria to do their work, or if the water table is raised and prevents the entrance of air to the root tips then cultivation with large shovels will throw up the surface in ridges and thus expose more soil from which evaporation takes place. As the moisture in the upper few inches evaporated that from below would be drawn up by capillarity and soon conditions would be more favorable for plant growth. This would also be true if the field were not well drained but water should be removed through tile drains if possible, since evaporation cools the soil and sometimes soluble substances are deposited at the surface that are injurious to plant development.



A study of the reports of cultivation at different stations shows that at some places deep culture continually gives better yields, at some shallow cultivation is better, while at others one depth has very little advantage over the other. Now, when various results are obtained in different states where soil and climate are not the same, it is reasonable to suppose that we may reach different conclusions on widely separated farms in this state. It may be that these reports suggest the final conclusion in regard to depth of cultivation, namely, that one depth is not preferable to another in all parts of the state. The temperature is not the same all over the state, there is considerable variation in rainfall of different sections, and a still greater difference in the soils of several localities. The physical condition of soils differs owing to kind of soil, climate, and previous treatment, so that the same methods could not be recommended for two farms unless these conditions were similar. Weeds are more of a nuisance in some localities than in others.

It would be a good plan for some reliable farmers to work out this problem in their own vicinities, and if they find that one depth continually gives better yields than another they should adopt that rather than take the advice of some one who does not know anything about their farms. If they find that one depth give better returns three times out of five, it is not a wise policy to accept the first one, practice it regularly, and run the risk of getting a poor crop two years out of five. It is their business to discover why the second plan worked better during two seasons, and when those conditions are duplicated they should take care that their treatment would produce maximum yields.

Weeds must be destroyed at all hazards, but no kind of subsequent treatment can correct a poor preparation of the seed bed.







If the work is done as it should be most of the weeds will be destroyed before the corn is up. Then the farmer is at liberty to use whatever depth of cultivation he thinks best. Some lint should be thrown around the hill even with shallow cultivation otherwise the upper whorls of roots will be exposed to the heat of the sun before they get into the soil. The heat may injure the tips so that they are of no use as food gatherers.

### Conclusion.

From what has been said it is clear that the question of depth of cultivation is far from being settled. Often the same results are not obtained on one farm year after year, and very different results are found on farms some distance apart. Averages slightly favor shallow culture but some years the deep cultivation gives decidedly better yields, so we can not recommend shallow culture to be practiced exclusively. Both climate and physical condition of the soil must be taken into consideration. A correct preparation of the seed bed is probably of much more importance than depth of cultivation.

Note.- After the above discussion was written a circular was published by this station giving results of last season's work. The table giving yields at several stations in different parts of the state is given below. The remark is often heard that last season was an "off" year and that no reliance can be placed on the results of these tests. It is true that an unusual amount of rain fell last season but it is of greater importance to know



how to raise a large crop on an "off" year than during a normal season. It is not a difficult matter to produce a good crop if the season is favorable but correct information as to the growing of maximum crops on "off" years will be of great value to the farmers of this state. A great many farmers lose as much with one poor crop as they gain in two or three good seasons.

#### Effect of Method of Cultivation.

(Yield, bushels per acre)

Methods	Trial	Urbana	Bibley	Bloomington	Jacksonv'l	Decatur	Gen.
bushels	No.	Field	Field	ten Field	field	field	Ave.
Deep	1	50.2	54.9	77.1	115.3	57.7	
cult.	2	57.3	53.4	36.5	35.3	57.5	
large	3	53.3	76.3	77.4	79.3	.....	
shovels	Ave	57.2	56.7	50.3	93.3	57.6	69.0
Medium	1	55.3	42.8	79.1	70.7	56.6	
cult.	2	71.6	71.1	86.1	51.3	53.7	
small	3	74.1	74.9	75.4	70.7	.....	
shovels	Ave.	67.1	62.7	80.2	74.2	55.2	67.9
Shallow	1	53.5	40.6	32.2	73.3	52.3	
cult.	2	67.5	59.2	73.4	74.7	.....	
weeders	3	67.7	71.1	70.7	67.3	.....	
	Ave.	64.6	60.3	75.4	71.7	52.3	64.9

Comments:- These results show some marked differences, but the fact that there is some measure of agreement among the different trials in a given field indicates that one method of cultivation may prove to be best for one type of soil while another may be best for another soil. ....





## DETASSLING

In order to understand the work in detassling it may be well to review a few facts connected with pollination and fertilization in corn. The tassel is composed of a main stem from which branch out a number of laterals. Along both the stem and laterals are borne pods each of which incloses six anthers. These anthers are in sets of threes and the upper set of three ripens a day or so before the lower set. The pollen on the main stem ripens first, a day or two later the upper laterals, and in about two days more the lower laterals. As the pollen ripens, the pods open and the anthers hang suspended by short filaments. The anther is a small narrow tube opening, not at the bottom, but at one side of the lower end as it hangs suspended. This may be a provision in nature to prevent in-breeding. Usually the pollen grains do not leave the anther unless shaken by the force of the wind, and when the force of the wind is sufficient to shake out the pollen it is strong enough to carry it away from the stalk on which it is produced.

While the tassel is forming there appear in the axils of five or six of the lower leaves rudimentary ears, but of these usually not more than one or two develop and they are formed highest up on the stalk. As these rudimentary ears increase in size silks are formed from the crowns of the ovaries or unfertilized kernels. These silks grow toward the tip of the ear and extend out beyond the husks in order to receive the pollen grains. Silks are usually not in a receptive condition until they have been exposed at least one day. If the silks are fertilized they cease to grow and the ends begin to dry, but if no pollen reaches the silks, growth continues as long as the stalk is green and the silk may extend





as much as a foot beyond the husk. When a pollen grain falls on a silk that is receptive a growth from the grain enters the tissue of the silk and passes down to the ovary, and as soon as this takes place the kernel begins to develop. The silks of the butt kernels appear first, then the silks of the remaining kernels in order toward the tip. In some ears the tip silks do not get beyond the husk, while in others they come out from six to eight days after the first silks appeared. In the latter case, most of the pollen has fallen so there is small chance for them to be fertilized.

There are approximately 1000 kernels on a good sized ear and for the fertilization of such an ear, as many pollen grains are required. If the pollen fell vertically down more than 1000 grains would have to fall on one square inch in order to fertilize the ear. The pollen really falls toward the silks, as they hang down, at an angle with the vertical so that more than one square inch of surface is exposed in the direction from which the pollen comes. Suppose that this number of grains should fall on one square inch, then for a surface three feet and six inches square, representing the amount occupied by one hill, there would be required 1,761,000 pollen grains. According to a table given below, a hill of two stalks belonging to the larger varieties <sup>particular</sup> would furnish about 50,000,000 grains. Now, taking allowance for the tassel ripening a day or two before the silks appear and that some of the silks are not out until after the pollen of the stalk has fallen, it is evident that more pollen is produced than is necessary for the fertilization of the kernels. It has been argued that the materials used to form the extra amount of pollen are, in a measure, wasted and that by reducing the amount of pollen produced, a larger ear will be formed. With this idea in view many experiments have been made in which the tassels of every

The first thing I noticed when I stepped out of the car was a warm, humid breeze that felt like a giant hand reaching out to greet me. The air was thick with the scent of tropical flowers and the distant call of birds. I took a deep breath, savoring the moment. The sun was high in the sky, casting a golden glow over the landscape. I could see the outlines of palm trees and the shimmering surface of the ocean in the distance. It was a beautiful sight, and I felt a sense of peace wash over me. I had finally reached my destination, and everything felt just as I needed it to be.

As I walked along the path, I noticed the vibrant colors of the tropical flora. The leaves of the palm trees were a deep green, and the fronds swayed gently in the breeze. I saw a small stream of water flowing through the forest, its surface reflecting the sunlight. The water was clear, and I could see the rocks at the bottom. I stopped for a moment to look at it, feeling a sense of wonder. The world around me was so beautiful, and I felt like I had discovered a hidden gem. I continued my walk, taking in the sights and sounds of this magical place. The air was so fresh, and the sun was so warm. It was a perfect day, and I was so lucky to be here.

I had heard so much about this place, and now I was finally experiencing it all for myself. The beauty of the landscape was beyond anything I could have imagined. The colors were so vibrant, and the sounds were so soothing. I felt like I had entered a dream world. The sun was so warm, and the air was so fresh. It was a perfect day, and I was so lucky to be here. I had found a place that was truly special, and I was so grateful for the experience. I would never forget this day, and I would cherish the memories I had made here. It was a truly magical experience, and I was so lucky to have it.

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other row, or of every alternate two rows, were removed, but as yet nothing definite has been proven.

Dr. Hottes of this station has given the following reason to show why detasseling should not be done continuously in the field from which the seed ears are selected. It is well established that pollen grains vary considerably in vigor and in the rapidity with which the pollen tube grows down the silk toward the ovary. When there is a large amount of pollen produced, the chances are that several grains will fall on each silk. Suppose that ten pollen grains fall on a silk and begin to grow. Growth would be retarded and slow in those grains possessing little vigor, while the more vigorous grains would send their tubes down quickly, the one growing most rapidly being the one to fertilize the ovary. But there may be only one grain in ten that is vigorous, so if we reduce the amount of pollen by one-half there is less chance of one strong grain falling on each silk to fertilize the kernel. It is quite probable that the kernels fertilized by weak pollen grains will not produce strong, rapid-growing plants, hence if seed be taken from such stalks and the detasseling continue for several years the corn is likely to lose vigor and germinating power. This station is now working in this direction and the results will be watched with interest.

The following experiment was conducted by myself during the past summer. Twenty four rows 210 hills long were used. The tassels were removed by hand from alternate pairs of rows as soon as the tip of the tassel could be seen coming out of the top leaf. As the corn did not tassel evenly it was necessary to go over the rows seven or eight times at intervals of two or three days. The corn was harvested and weighed November 8th.





Rows	Pounds corn	Decrease
1,2, Detasseled	467	15 lbs.
3,4, Not detasseled	432	
5,6, Detasseled	504	32 "
7,8, Not detasseled	523	
9,10, Detasseled	462	50
11,12, Not detasseled	512	
13,14, Detasseled	434	43 "
15,16, Not detasseled	532	
17,18, Detasseled	503	33 "
19,20, Not detasseled	546	
21,22 Detasseled	502	49 "
23,24, Not detasseled	551	

The table shows a decrease in every case and the average loss on two rows was thirty seven pounds or at the rate of four and one-eighth bushels per acre. Different results might have been <sup>obtained</sup> if alternate rows had been detasseled, instead of alternate pairs of rows, because the chances for complete fertilization would have been greater.

The work of detasseling has been carried on at several experiment stations with varying results. A common plan was to try the experiment one year, and, if the yields were increased by detasseling, to recommend that the farmers go through their corn and detassel alternate rows. Perhaps the second year no effect was noticed and the third year a decreased yield was obtained by detasseling. The work would then be dropped with the advice that it should not be done by farmers. So far as I know no station has continued the work for more than three or four years except this station. The following table will indicate the amount of work done that has been reported.

Year	Age	Sex	Weight
1901	10	Male	11.5
1902	11	Male	12.0
1903	12	Male	12.5
1904	13	Male	13.0
1905	14	Male	13.5
1906	15	Male	14.0
1907	16	Male	14.5
1908	17	Male	15.0
1909	18	Male	15.5
1910	19	Male	16.0
1911	20	Male	16.5
1912	21	Male	17.0
1913	22	Male	17.5
1914	23	Male	18.0
1915	24	Male	18.5
1916	25	Male	19.0
1917	26	Male	19.5
1918	27	Male	20.0
1919	28	Male	20.5
1920	29	Male	21.0
1921	30	Male	21.5
1922	31	Male	22.0
1923	32	Male	22.5
1924	33	Male	23.0
1925	34	Male	23.5
1926	35	Male	24.0
1927	36	Male	24.5
1928	37	Male	25.0
1929	38	Male	25.5
1930	39	Male	26.0
1931	40	Male	26.5
1932	41	Male	27.0
1933	42	Male	27.5
1934	43	Male	28.0
1935	44	Male	28.5
1936	45	Male	29.0
1937	46	Male	29.5
1938	47	Male	30.0
1939	48	Male	30.5
1940	49	Male	31.0
1941	50	Male	31.5
1942	51	Male	32.0
1943	52	Male	32.5
1944	53	Male	33.0
1945	54	Male	33.5
1946	55	Male	34.0
1947	56	Male	34.5
1948	57	Male	35.0
1949	58	Male	35.5
1950	59	Male	36.0
1951	60	Male	36.5
1952	61	Male	37.0
1953	62	Male	37.5
1954	63	Male	38.0
1955	64	Male	38.5
1956	65	Male	39.0
1957	66	Male	39.5
1958	67	Male	40.0
1959	68	Male	40.5
1960	69	Male	41.0
1961	70	Male	41.5
1962	71	Male	42.0
1963	72	Male	42.5
1964	73	Male	43.0
1965	74	Male	43.5
1966	75	Male	44.0
1967	76	Male	44.5
1968	77	Male	45.0
1969	78	Male	45.5
1970	79	Male	46.0
1971	80	Male	46.5
1972	81	Male	47.0
1973	82	Male	47.5
1974	83	Male	48.0
1975	84	Male	48.5
1976	85	Male	49.0
1977	86	Male	49.5
1978	87	Male	50.0
1979	88	Male	50.5
1980	89	Male	51.0
1981	90	Male	51.5
1982	91	Male	52.0
1983	92	Male	52.5
1984	93	Male	53.0
1985	94	Male	53.5
1986	95	Male	54.0
1987	96	Male	54.5
1988	97	Male	55.0
1989	98	Male	55.5
1990	99	Male	56.0
1991	100	Male	56.5
1992	101	Male	57.0
1993	102	Male	57.5
1994	103	Male	58.0
1995	104	Male	58.5
1996	105	Male	59.0
1997	106	Male	59.5
1998	107	Male	60.0
1999	108	Male	60.5
2000	109	Male	61.0
2001	110	Male	61.5
2002	111	Male	62.0
2003	112	Male	62.5
2004	113	Male	63.0
2005	114	Male	63.5
2006	115	Male	64.0
2007	116	Male	64.5
2008	117	Male	65.0
2009	118	Male	65.5
2010	119	Male	66.0
2011	120	Male	66.5
2012	121	Male	67.0
2013	122	Male	67.5
2014	123	Male	68.0
2015	124	Male	68.5
2016	125	Male	69.0
2017	126	Male	69.5
2018	127	Male	70.0
2019	128	Male	70.5
2020	129	Male	71.0
2021	130	Male	71.5
2022	131	Male	72.0
2023	132	Male	72.5
2024	133	Male	73.0
2025	134	Male	73.5
2026	135	Male	74.0
2027	136	Male	74.5
2028	137	Male	75.0
2029	138	Male	75.5
2030	139	Male	76.0
2031	140	Male	76.5
2032	141	Male	77.0
2033	142	Male	77.5
2034	143	Male	78.0
2035	144	Male	78.5
2036	145	Male	79.0
2037	146	Male	79.5
2038	147	Male	80.0
2039	148	Male	80.5
2040	149	Male	81.0
2041	150	Male	81.5
2042	151	Male	82.0
2043	152	Male	82.5
2044	153	Male	83.0
2045	154	Male	83.5
2046	155	Male	84.0
2047	156	Male	84.5
2048	157	Male	85.0
2049	158	Male	85.5
2050	159	Male	86.0
2051	160	Male	86.5
2052	161	Male	87.0
2053	162	Male	87.5
2054	163	Male	88.0
2055	164	Male	88.5
2056	165	Male	89.0
2057	166	Male	89.5
2058	167	Male	90.0
2059	168	Male	90.5
2060	169	Male	91.0
2061	170	Male	91.5
2062	171	Male	92.0
2063	172	Male	92.5
2064	173	Male	93.0
2065	174	Male	93.5
2066	175	Male	94.0
2067	176	Male	94.5
2068	177	Male	95.0
2069	178	Male	95.5
2070	179	Male	96.0
2071	180	Male	96.5
2072	181	Male	97.0
2073	182	Male	97.5
2074	183	Male	98.0
2075	184	Male	98.5
2076	185	Male	99.0
2077	186	Male	99.5
2078	187	Male	100.0
2079	188	Male	100.5
2080	189	Male	101.0
2081	190	Male	101.5
2082	191	Male	102.0
2083	192	Male	102.5
2084	193	Male	103.0
2085	194	Male	103.5
2086	195	Male	104.0
2087	196	Male	104.5
2088	197	Male	105.0
2089	198	Male	105.5
2090	199	Male	106.0
2091	200	Male	106.5
2092	201	Male	107.0
2093	202	Male	107.5
2094	203	Male	108.0
2095	204	Male	108.5
2096	205	Male	109.0
2097	206	Male	109.5
2098	207	Male	110.0
2099	208	Male	110.5
2100	209	Male	111.0
2101	210	Male	111.5
2102	211	Male	112.0
2103	212	Male	112.5
2104	213	Male	113.0
2105	214	Male	113.5
2106	215	Male	114.0
2107	216	Male	114.5
2108	217	Male	115.0
2109	218	Male	115.5
2110	219	Male	116.0
2111	220	Male	116.5
2112	221	Male	117.0
2113	222	Male	117.5
2114	223	Male	118.0
2115	224	Male	118.5
2116	225	Male	119.0
2117	226	Male	119.5
2118	227	Male	120.0
2119	228	Male	120.5
2120	229	Male	121.0
2121	230	Male	121.5
2122	231	Male	122.0
2123	232	Male	122.5
2124	233	Male	123.0
2125	234	Male	123.5
2126	235	Male	124.0
2127	236	Male	124.5
2128	237	Male	125.0
2129	238	Male	125.5
2130	239	Male	126.0
2131	240	Male	126.5
2132	241	Male	127.0
2133	242	Male	127.5
2134	243	Male	128.0
2135	244	Male	128.5
2136	245	Male	129.0
2137	246	Male	129.5
2138	247	Male	130.0
2139	248	Male	130.5
2140	249	Male	131.0
2141	250	Male	131.5
2142	251	Male	132.0
2143	252	Male	132.5
2144	253	Male	133.0
2145	254	Male	133.5
2146	255	Male	134.0
2147	256	Male	134.5
2148	257	Male	135.0
2149	258	Male	135.5
2150	259	Male	136.0
2151	260	Male	136.5
2152	261	Male	137.0
2153	262	Male	137.5
2154	263	Male	138.0
2155	264	Male	138.5
2156	265	Male	139.0
2157	266	Male	139.5
2158	267	Male	140.0
2159	268	Male	140.5
2160	269	Male	141.0
2161	270	Male	141.5
2162	271	Male	142.0
2163	272	Male	142.5
2164	273	Male	143.0
2165	274	Male	143.5
2166	275	Male	144.0
2167	276	Male	144.5
2168	277	Male	145.0
2169	278	Male	145.5
2170	279	Male	146.0
2171	280	Male	146.5
2172	281	Male	147.0
2173	282	Male	147.5
2174	283	Male	148.0
2175	284	Male	148.5
2176	285	Male	149.0
2177	286	Male	149.5
2178	287	Male	150.0
2179	288	Male	150.5
2180	289	Male	151.0
2181	290	Male	151.5
2182	291	Male	152.0
2183	292	Male	152.5
2184	293	Male	153.0
2185	294	Male	153.5
2186	295	Male	154.0
2187	296	Male	154.5
2188	297	Male	155.0
2189	298	Male	155.5
2190	299	Male	156.0
2191	300	Male	156.5
2192	301	Male	157.0
2193	302	Male	157.5
2194	303	Male	158.0
2195	304	Male	158.5
2196	305	Male	159.0
2197	306	Male	159.5
2198	307	Male	160.0
2199	308	Male	160.5
2200	309	Male	161.0
2201	310	Male	161.5
2202	311	Male	162.0
2203	312	Male	162.5
2204	313	Male	163.0
2205	314	Male	163.5
2206	315	Male	164.0
2207	316	Male	164.5
2208	317	Male	165.0
2209	318	Male	165.5
2210	319	Male	166.0
2211	320	Male	166.5
2212	321	Male	167.0
2213	322	Male	167.5
2214	323	Male	168.0
2215	324	Male	168.5
2216	325	Male	169.0
2217	326	Male	169.5
2218	327	Male	170.0
2219	328	Male	170.5
2220	329	Male	171.0
2221	330	Male	171.5
2222	331	Male	172.0
2223	332	Male	172.5

State	No. of trials	Crop increased	No effect	Crop decreased	Increase paid for work
N.Y. Cornell	4	3	1		3
Delaware	2	2			2
Georgia	2		1	1	
Kansas	3	1	1	1	1
Maryland	1			1	
Michigan	1	1			
Nebraska	3			3	
Ohio	2		1	1	
South Carolina	1	1			1
Utah	2			2	
Illinois	7	3	2	2	1

In order for the work to be effective it is necessary that the tassels be removed before the pollen is formed. The proper way to do this is to pull by hand as soon as the tip of the tassel appears. Sometimes the last leaf comes away with it but this leaf is small anyway so that its removal does not materially injure the plant's development. A part of those who made the above experiments went along and cut off the tassels with a corn knife. In this case either the tassels were well out and the pollen already formed, or several of the upper leaves would be removed. If the pollen had developed before the tassel was removed no increased yield could be expected, while if several leaves were cut off an actual decrease might reasonably follow. Hence the reports from the different stations do not give a fair idea of the merits or defects of the practice.

It has been estimated that the cost of detasseling amounts to about a dollar to a dollar and a quarter per acre. This would





require an increase of from three to five bushels per acre to pay for the work done. In the last table it will be seen that only <sup>eight</sup> ~~seven~~ out of twenty eight experiments paid for the labor of detasseling.

So far as I know the effect of different seasons on the development of pollen has not yet been worked out. This is an important and may throw light on the varying results thus far obtained by detasseling. It has been observed that on one year there is formed a small amount of pollen in comparison with the amount on another year, but just what effect is produced by the sun, moisture, heat or wind is not known. If this information were at hand the farmer might be able to judge with a reasonable degree of certainty whether he should detassel or not, since the time of appearance of the tassel is only five or six days earlier than the time of ripening of the pollen.

#### Conclusion.

From the results thus far obtained detasseling can not yet be recommended as a general practice.





## SUCKERS AND BARLEY STALKS

Last summer I noticed that the suckers were very numerous on a piece of bad ground. There were suckers in almost every hill, and where there was only one stalk in a hill it was not uncommon to find three and sometimes four suckers. Figure 6 shows a stalk with five suckers. In order to find out whether the presence of these suckers would reduce the yield, ten rows a hundred hills long were left alone and from the next ten all suckers were removed. It was thought best to use several rows together rather than only one or two for comparison, for then the appropriation of moisture and plant food by the suckers would be more noticeable. The yields were:

Rows	Treatment	Pounds	Bu. per acre.
10	Not touched	1590	74.4
10	Suckers removed	1530	71.5

This shows a loss of nearly three bushels per acre by removing the suckers. This difference is not large enough for a definite conclusion.

Very little information has been published in regard to the effects of removing the suckers from the plant soon after they appear. A number of years ago the experiment was tried at the Kansas Station and the work was repeated in 1889 with similar results. The yields from the last experiment were as follows:

Rows	Treatment	Ears	Hubbins	Rate of yield
8	Suckers removed	37.62 lbs.	9.12 lbs.	59.40 bu.
8	Untreated	38.57 "	14.23 "	63.14 "





Fig. 6. a stalk with some suckers.





Each one of the eight rows was next adjacent to one of the rows not treated. The investigator comments on the results by saying that "the removal of suckers was a positive loss to the crop in every respect save one. The yield per acre of the suckered rows was five bushels less than that obtained in the adjacent untreated rows, and there was a corresponding loss in the yield of each plant. The quality of the corn yielded on the suckered rows was markedly superior to that obtained from the other specially treated rows. It was better than that obtained from the untreated rows and greatly superior to the product of the detasseled and topped rows which were frequently very poor. The reason for the superiority of the corn obtained from the suckered rows is easily explained by the absence of the lateral shoots and the consequent small ears which they bear!"

Advice is often given to farmers to go through their corn and pull out the suckers or to detassel the suckers before the pollen is ready to fall. The reason given for pulling the suckers is that they require nourishment from the parent plant which should be using the plant food and moisture in its own growth and in the development of an ear. Careful observations have not been made by myself during a number of seasons but from what I have seen during the past year on different kinds of soil I am lead to believe that suckers are more numerous where there is an abundance of plant food and during a season favorable for a large rapid growth. A sudden checking of growth by hot dry weather will also start them. A sucker starts at, or a little below, the surface of the ground and soon develops a root system of its own. As the roots are being formed the sucker becomes less and less dependent on the parent for nourishment, and, when three or four feet in height, is almost detached from the plant. Since the sucker has both a root system



and a leaf surface of its own the injury to the parent plant can not be very great on a favorable year. These shoots may even lock up plant food that would otherwise be lost. If the suckers begin to grow and the season turns dry, then the loss of moisture through the suckers might reduce the yield of the parent plants.

The reason given for detasseling the suckers before pollination takes place is based on the supposition that the kernels fertilized by the pollen of suckers have low vitality and do not produce strong vigorous plants. But I noticed last season that the tassels of suckers did not ripen usually until after the pollen from the main stalks had fallen. In estimating the number of pollen grains in each, it was very difficult to find a plant and its sucker, both of which had ripe pollen. Now, it is a well known fact that the pollen of fertile stalks falls before the tip silks are out, so that often the only way in which these silks can be pollinated is by the pollen from the suckers. The tips of the ears are usually discarded in planting so no harm can come from them and there may be an increased yield on account of the presence of the suckers.

An Indiana farmer reported that "one season a drouth came at a time to develop numerous suckers. A second drouth while not preventing tasseling and formation of some pollen, checked earing. This was followed by a continuation of the very best corn weather, forcing the silk-covered cobs far beyond the husks. But where was the fertilizing pollen to come from? Not from the tassels of the original stalks for they were dead or exhausted. This proved to be a case where it was not best to interfere with nature by destroying the suckers, for they were numerous enough to furnish sufficient pollen and at the right time too to make a full crop. A few acres of the corn planted with corn crib seed and averaging about one stalk per hill had more suckers than original stalks and







fully seventy five per cent of the suckers had fair sized ears on the side of the stalks instead of grain tassels as is usual!

### Conclusion.

Removing suckers from the corn plant is not analogous to the pruning of branches from fruit trees, since suckers are dependent on the parent plant only until they have developed a root system of their own. Except in corn raised for seed where quality is desired, it is doubtful whether it pays to pull the suckers or to detassel them.

### Barren Stalks.

A few years ago a large per cent, almost one-third of the stand, was reported from different parts of the state as being barren and the idea was started at once that the barrenness was the result of pollen from barren stalks fertilizing the kernels used for seed. The attempt was made to breed out the barren stalks by detasseling them and according to count the attempt was apparently successful. During the past year, however, reports from different fields where no attempt was made to breed out barrenness show the number to be very small, probably not over two or three per cent. This would indicate that barrenness was not due to heredity but to unfavorable conditions of climate, lack of moisture and plant food, or too many stalks to the hill.

THE STATE OF NEW YORK  
IN SENATE  
January 27, 1904.  
REPORT OF THE  
COMMISSIONERS OF THE LAND OFFICE  
IN RESPONSE TO A RESOLUTION PASSED BY THE SENATE  
MAY 15, 1903.

ALBANY:  
J.B. LIPPINCOTT & CO. PRINTERS.  
1904.

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1904.

## TASSELING AND SILKING OF CORN

No very definite statements have been published in regard to the time of tasseling, of ripening of the pollen, and of the appearance of the silks. Statements are found in books on corn culture that the tassel ripens and allows the pollen to fall before the silks can be seen. Other writers assert that the tassel ripens and silks appear about the same time. If the first statement is true there is no chance for in-breeding by natural pollination, while if the second statement is true this might occur. It is doubtful if in-breeding ever occurs to any considerable extent because the pollen does not fall unless the tassel is shaken, and then it does not usually go vertically downward. In order to determine the facts for the past year, observations were made of ten representative stalks of each of seventeen varieties grown on the experiment station farm. This work began the twenty third of July, and observations were made and changes recorded every morning until the eighth of August. The first column is the number of the stalk; the second the date in July when the tassels appeared; the third, the date on which the main stem of the tassel ripened. The remainder of the tables will be readily understood from the headings. Some of the tassels were out before the observations began and this fact is shown by the star. (\*) By tip silk is meant that from the last three-fourths inch of cob.

The last row of figures in each table represents the average relative time of the change in development counted from the day the top of the tassel ripened. For instance, in Johnson County White the day of ripening of the top tassel is called one, then the third day following, the middle of the tassel ripened, and between the fourth and fifth days the lower part of tassel ripened. The second day the butt silks appeared, etc.



# THE HISTORY OF THE

The history of the world is a vast and intricate web of events, each thread woven by the hands of countless individuals. From the dawn of time to the present day, the human story has unfolded in a series of interconnected chapters, each with its own unique challenges and triumphs. The early years of our species are shrouded in mystery, but the archaeological record reveals a long and complex journey. As civilizations emerged, the story became more tangible, with written records and monumental structures marking the passage of time. The rise and fall of empires, the spread of religions, and the evolution of societies have shaped the world we know today. Each era has contributed to the rich tapestry of human history, leaving behind a legacy of knowledge and experience that continues to inspire and guide us. The future, though uncertain, holds the promise of new discoveries and a deeper understanding of our place in the universe. The history of the world is not just a collection of facts, but a living, breathing story that connects us all.



No. of stalks	Trunk exposed	Top ribbons	Mid. 4th ribbons	Butt of 2nd. ribbons	Rich 1st ribbons	Yell. 2nd ear	Middle 2nd	Tip 2nd	Will begin to 3rd
Johnson Co. White, L.B. Clore									
1	23	27	30	31	27	0	29	4	1
2	23	23	30	2	31	0	1	3	2
3	24	1	1	3	3	0	4	0	3
4	24	29	31	3	1	0	3	6	4
5	*	20	30	30	30	31	31	4	1
6	24	29	31	1	30	0	31	8	2
7	23	27	30	31	23	0	29	5	1
8	23	29	31	*1	29	31	29	4	1
9	23	27	29	31	27	27	29	0	1
10	24	30	1	2	2	0	3	0	4
	1	3	4½	2	2½	3½	3½	5½	

Boone Co. White, J.O. Toland									
1	23	31	2	3	1	0	2	0	4
2	24	31	1	2	1	0	2	7	6
3	24	30	30	31	31	0	3	3	5
4	*	27	23	31	29	0	1	5	4
5	*	25	27	30	25	27	29	3	31
6	*	24	27	30	27	0	23	6	1
7	24	29	31	2	30	0	2	6	3
8	24	27	30	31	29	30	30	5	2
9	*	25	29	31	23	0	30	6	1
10	*	31	31	2	Barren				
	1	3	5½	2½	3½	4½	9	7	

No. of stalks	Trunk exposed	Too narrow	Will begin to 2nd	Lower 2nd. ribbons	Rich 1st ribbons	Yell. 2nd ear	Middle 2nd	Tip 2nd	Will begin to 3rd
Silver Mine, F.A. Warner									
1	*	25	27	29	25	0	23	2	29
2	*	25	27	30	25	27	27	1	30
3	*	25	27	29	26	0	29	1	30
4	*	24	27	29	25	26	27	4	30
5	*	29	27	30	26"	0	1	4	1
6	*	24	27	31	25	27	26	1	31
7	*	28	29	31	30	0	31	4	3
8	*	25	27	29	23	29	29	7	1
9	*	27	23	31	26	23	29	4	31
10	*	25	23	30	30	0	1	7	4
		3	5	2	3	4	10	7	

Burrs White, L. Griswold									
1	*	23	23	31	31*	0	1	5	3
2	*	*	24	27	23	0	29	1	1
3	23	26	27	29	25	31	27	2	30
4	*	*	24	27	25	0	26	2	30
5	*	24	27	29	25	0	27	2	30
6	*	27	23	30	25	27	27	1	30
7	*	24	27	30	25	26	27	1	29
8	*	25	27	29	27	0	29	4	31
9	*	24	26	27	27	27	29	0	31
10	*	24	26	30	26	0	27	1	30
	1	3	5½	3	3½	5	10	7	



No. of Stalks	Top Ripened	Middle Ripened	Lower Ripened	Side Ripened	Side Ripened	Middle Ripened	Top Ripened	Side Ripened	Side Ripened
Banner White, J. R. Batcher									
1	*	25	27	29	31	25	27	30	30
2	*	24	25	23	25	27	26	31	31
3	*	24	27	29	25	0	29	3	1
4	23	23	23	30	23	23	29	4	31
5	*	24	27	30	23	0	27	1	31
6	*	24	25	29	26	23	23	2	31
7	*	23	28	31	26	0	23	3	31
8	*	27	23	30	26	0	30	5	1
9	*	*	21	23	25	23	27	0	30
10	*	24	26	23	27	23	30	3	31
		1	23	5	2	31	4	9	7

No. of Stalks	Top Ripened	Middle Ripened	Lower Ripened	Side Ripened	Side Ripened	Middle Ripened	Top Ripened	Side Ripened	Side Ripened
Banner, A. B. Chester									
1	*	24	25	30	27	0	28	3	1
2	*	26	27	30	28	0	29	3	1
3	*	24	25	29	30	0	1	6	2
4	24	23	30	31	29	31	30	6	1
5	*	24	27	20	30	0	31	6	2
6	*	21	27	29	25	0	27	2	30
7	*	27	23	31	27	0	28	2	31
8	*	27	23	31	29	0	31	6	1
9	*	*	21	27	25	27	27	2	30
10	*	24	25	23	26	29	26	2	31
		1	23	53	31	5	5	11	73

Peerless White, J. R. Overstreet									
1	24	29	31	1	30	0	2	3	2
2	24	31	31	3	31	0	2	6	3
3	24	29	31	1	31	0	1	7	3
4	23	23	29	31	28	0	2	0	3
5	23	23	31	1	31	0	1	6	4
6	23	23	31	1	31	0	1	5	4
7	23	27	28	30	1	0	2	5	4
8	*	24	27	29	27	23	23	4	31
9	*	23	27	23	23	30	30	4	1
10	*	*	24	27	25	0	23	2	31
		1	3	43	3	5	5	10	7

Reil's Yellow Dent, J. L. Reil									
1	24	30	31	2	31	0	1	4	2
2	24	30	31	2	31	2	1	6	3
3	*	24	27	30	27	0	23	3	31
4	24	23	29	1	28	30	29	4	1
5	*	27	23	29	27	23	23	1	31
6	*	25	27	29	29	0	31	6	2
7	23	27	23	31	23	0	30	0	2
8	24	30	30	31	29	29	30	3	2
9	23	27	23	1	27	29	29	6	1
10	24	23	29	30	30	3	1	6	2
		1	2	43	2	3	33	33	6





*No. of 2 weeks*  
*1. appeared*  
*Top Ripe*  
*Middle Ripe*  
*Lower Two Ripe*  
*W. appeared*  
*Silk 1/2 inch long*  
*Middle 1/2 inch*  
*Tip 1/2 inch*  
*Silk 1/2 inch long*

Pride of the North, F.A. Warner

1	*	24	27	28	23	24	25	29	33
2	*	25	27	29	26	0	27	2	30
3	*	23	29	30	25	23	27	2	30
4	*	25	27	23	24	0	27	1	29
5	*	24	25	23	23	26	27	2	30
6	*	*	24	25	30	0	1	3	3
7	*	27	23	29	25	27	27	2	30
8	*	*	24	27	25	0	27	4	30
9	*	25	23	23	25	27	27	1	29
10	*	23	25	27	23	0	26	0	29
		1	3	13	13	2	4	9	31

*No. of 2 weeks*  
*1. appeared*  
*Top Ripe*  
*Middle Ripe*  
*Lower Two Ripe*  
*Silk appeared*  
*Silk 1/2 inch long*  
*Middle 1/2 inch*  
*Tip 1/2 inch*  
*Silk began to dry*

Golden Eagle, H.B. Perry

1	*	24	25	27	25	0	26	2	29
2	*	26	23	30	27	23	29	4	31
3	*	27	23	31	23	0	29	2	1
4	*	24	27	23	26	23	23	4	29
5	*	23	25	23	23	24	27	29	23
6	*	23	25	27	27	23	29	4	31
7	*	24	25	27	25	26	27	2	30
8	*	25	27	23	27	0	23	3	31
9	*	23	25	27	23	26	27	31	29
10	*	*	*	23	23	0	26	29	29
		1	3	5	2	1	4	10	31

Riley's Favorite, Jas. Riley

1	24	23	23	31	23	29	29	3	31
2	23	26	23	30	23	0	29	4	1
3	23	23	31	31	23	0	29	4	1
4	25	Broken by wind July 30							
5	24	23	23	30	23	29	23	1	31
6	*	24	23	27	27	0	29	5	1
7	23	27	29	30	23	30	29	2	1
8	*	27	23	30	29	0	30	3	2
9	*	24	25	27	27	0	23	1	31
10	24	23	31	2	30	0	1	4	2
	1	23	13	23	3	4	33	31	

Calico, Funk Seed Co.

1	24	27	23	30	23	0	29	4	1
2	23	23	30	31	27	30	29	3	31
3	24	29	30	31	27	23	23	3	31
4	25	1	3	3	2	0	3	7	5
5	24	27	23	30	23	25	26	1	29
6	*	27	23	30	27	0	23	3	31
7	23	27	30	31	26	26	23	3	31
8	*	25	27	30	27	0	29	2	31
9	*	24	25	23	25	0	27	1	30
10	25	23	31	2	23	0	29	2	1
	1	3	13	1	1	2	7	5	



No. of stalk  
Tassel appeared  
Top Ripe  
Middle Ripe  
Lower Tass. Ripe  
Silk appeared  
Silk of end ear.  
Middle silk  
Tip silk  
Silk began to dry.

Groves Golden Dent, Funk Seed Co.

1	*	25	27	23	27	0	23	1	1
2	*	23	26	26	25	0	27	1	30
3	24	23	29	1	29	0	30	4	1
4	*	27	23	31	23	0	23	1	31
5	23	27	23	31	30	0	31	3	1
6	*	24	25	23	23	0	29	2	1
7	*	24	25	23	27	0	23	3	1
8	*	27	23	31	23	25	27	31	30
9	24	27	30	31	30	0	30	4	1
10	24	29	31	2	31	0	2	5	4
		1	2	43	24	2	33	3	6

No. of stalk  
Tassel appeared  
Top. Ripe  
Middle Ripe  
Lower Tass. Ripe  
Silk appeared  
Silk of end ear  
Middle silk  
Tip silk  
Silk began to dry

Gall Mine, B. A. Ryan

1	*	26	27	30	27	0	23	2	1
2	*	24	25	23	24	0	27	31	29
3	*	*	24	23	24	0	27	31	29
4	*	*	24	27	23	25	27	2	30
5	*	*	24	27	24	0	26	30	30
6	23	27	23	30	23	0	29	4	1
7	*	24	25	23	23	0	29	4	2
8	*	25	27	23	25	0	27	5	30
9	*	24	23	23	25	25	27	29	29
10	*	26	26	29	25	23	26	29	30
		1	2	5	2	2	4	3	7

Pride of Wishes, J. R. Ratchin

1	*	23	23	31	27	0	23	2	31
2	*	27	31	2	31	0	1	7	4
3	*	27	30	31	31	0	2	4	4
4	*	27	23	30	31	0	1	6	2
5	*	25	27	29	25	26	27	4	31
6	*	24	27	23	26	0	26	4	1
7	23	23	30	1	1	0	2	7	4
8	*	*	24	26	27	0	29	3	1
9	*	24	25	23	30	27	31	0	31
10	24	30	1	2	31	0	2	4	3
		1	3	5	4	3	5	10	3

90 Day, Funk Seed Co.

1	*	26	27	29	26	23	23	1	31
2	24	27	29	31	29	29	30	7	1
3	24	27	26	31	23	23	29	2	1
4	23	26	27	30	26	26	27	1	29
5	23	27	29	31	23	30	29	2	1
6	*	23	26	27	25	26	23	1	30
7	*	*	24	23	23	0	26	1	30
8	*	*	*	24	25	0	27	4	31
9	*	26	23	29	25	0	27	1	30
10	23	23	31	1	30	0	31	5	3
		1	3	5	2	3	3	3	6





	1st	2nd	3rd	4th	5th	6th	7th	8th	9th
	seed	top ripened	middle ripened	butt ripened	silk appeared	silk 2nd day	middle silks	tip silks	silk begun to dry
Mastadon, Funk Seed Co.									
1	*	27	28	30	26	0	23	6	31
2	24	23	31	1	31	0	1	7	3
3	23	31	31	1	31	0	1	7	3
4	23	31	31	2	2	0	3	0	4
5	*	27	28	30	26	27	23	1	30
6	*	*	24	27	*	0	25	25	29
7	*	24	25	29	23	23	25	31	29
8	24	25	27	29	29	23	23	4	1
9	*	24	25	28	30	0	1	6	3
10	*	24	25	30	30	0	3	7	4
		1	2	4½	3	2	4½	10½	7

A study of these tables shows that the middle of the tassel ripens about the second or third day after the top ripens, and the lower part is all ripe before the sixth day. The silk appears once in a while before the pollen begins to fall but usually about the second or third <sup>day</sup> after the top of the tassel ripens. The middle silks are out a day or two after the butt silks appear. The tip silks, however, do not usually get beyond the husks until from six to eleven days after the first pollen has fallen, and two or three days after the lowest pollen has gone. In most cases the first silks began to dry before the tip silks appeared.



## Number of Pollen Grains.

Below is a table giving approximately the number of pollen grains in a fertile stalk, a sucker and a barren stalk. The first part of the table represent tassels taken from a stalk and its sucker. The tassel of the barren stalk was taken from the same hill as the fertile stalk unless the other tassels in that hill were unusually small, when the fertile stalk was chosen near by. The pollen grains were poured or shaken from the anther into narrow rows on a glass slide. The slide was then passed under the low power of the microscope and the grains were counted. The number of grains in an anther on the main stem did not differ much from the number in an anther of the lateral branches.

Variety	Stalk	Pods on tassel	Pollen in anther	Pollen grains in tassel. Approx.
Boone Co. White	Fertile	2093	2527	31,734,000
"	" Sucker	1939	1733	20,801,000
Leaming	Fertile	1756	2387	25,151,000
"	Sucker	1742	2209	23,033,000
Silver Mine	Fertile	1189	2354	13,795,000
"	" Sucker	1630	1257	12,670,000
Reid's Yel. Dent	Fertile	1671	1893	13,979,000
"	" " Barren	2000	2150	25,320,000
Boone Co. White	Fertile	1958	2938	34,515,000
"	" Barren	2974	2316	50,248,000
Silver Mine	Fertile	1553	2284	20,565,000
"	" Barren	2355	2554	35,325,000
Johnson Co. White	Fertile	2139	2284	23,394,000
"	" " Barren	2331	2554	41,665,000





## SUMMARY

1. Root pruning did not show as marked effects last year as on ordinary years. That pruned two and four inches from the hill and that pruned six, eight, and ten inches deep was injured to a considerable extent. On the other work there was not enough difference to support any conclusions. Generally root pruning lessens the yield and the deeper the pruning, or the closer to the hill, the greater is the loss on the pruned rows.

2. The first four or five sets of roots grow in a horizontal direction from two to four feet, then turn down and grow from two to five feet more. The later whorls of roots go down at a rather sharp angle from the first.

3. It is probable that the same depth of cultivation is not best for all kinds of soil, owing to differences in climate and in the physical conditions of the soil.

4. From present data detasseling can not be practiced with the assurance of securing an increased yield sufficient to pay for the labor of detasseling.

5. Removing suckers may be of advantage on a dry season or where quality is desired, but on ordinary years it is probable that they do not do any great harm. Barren stalks may be the result of a lack of nourishment.

6. The silks of corn usually appear one or two days after the top of the tassel ripens. The tip silks do not often appear until all of the pollen has fallen from the tassel.

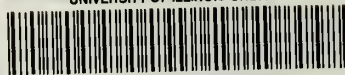
7. From a table given it is evident that a fertile stalk has considerably more pollen than its sucker, and a barren stalk has almost one-half more than an average fertile stalk.







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